

CLAIMS

What is claimed is:

- 1 1. A method of managing a network entity that is initiated by the network entity, the
2 method comprising the computer-implemented steps performed at the network entity of:
3 monitoring the network entity;
4 periodically evaluating one or more specified conditions at the managed network
5 entity;
6 when one or more of the specified conditions are satisfied, then gathering specified
7 information from the managed network entity, preparing a message that
8 includes the specified information and the specified conditions that were
9 satisfied, and sending the message to a management point.
- 1 2. A method of managing a network entity that is initiated by the network entity, the
2 method comprising the computer-implemented steps of:
3 receiving a request from a management application for interaction with the managed
4 network entity;
5 creating a management request that includes a network element identifier;
6 storing a management request in a management proxy while awaiting a poll for the
7 management request from the managed network entity;
8 receiving a periodic poll message from the managed network entity, wherein the poll
9 message requests any available management requests applicable to the
10 managed network entity;
11 selecting one or more management requests that match the managed network entity;
12 and
13 delivering the selected one or more management requests to the managed network
14 entity.
- 1 3. A method as recited in Claim 2, further comprising the steps of:
2 receiving a responsive management message from the managed network entity;

3 storing the responsive management message in the management proxy;
4 receiving a second poll message from the management application, wherein the
5 second poll message requests any responsive management messages
6 applicable to the management application;
7 selecting one or more responsive management messages that match the management
8 application; and
9 delivering the selected one or more responsive management messages to the
10 management application.

1 4. A method as recited in any of Claims 1 or 2, wherein the network entity is within a
2 private network that is managed by a network service provider, and wherein the management
3 point is within a public network that is owned or operated by the network service provider.

1 5. A method as recited in any of Claims 1 or 2, wherein the network entity is a service
2 appliance.

1 6. A method as recited in any of Claims 1 or 2, wherein the network entity is a switch or
2 router.

1 7. A system for managing a network entity, comprising:
2 one or more management applications hosted in a service provider network;
3 a management communication program that is and communicatively coupled to the
4 management applications, and comprising one or more sequences of
5 instructions which, when executed by the network entity, causes the network
6 entity to perform the steps of:
7 monitoring the network entity;
8 periodically evaluating one or more specified conditions at the network entity;
9 when one or more of the specified conditions are satisfied, then gathering specified
10 information from the network entity, preparing a message that includes the
11 specified information and the specified conditions that were satisfied, and
12 sending the message to the management applications.

1 8. A system as recited in Claim 7, further comprising a management communication
2 transport element hosted in the private network, and wherein the step of sending the message
3 to the management applications comprises the step of sending the message to the
4 management applications using the management communication transport element.

1 9. A system as recited in Claim 8, wherein the management communication transport
2 element is hosted at the network entity.

1 10. A system as recited in Claim 8, wherein the management communication transport
2 element is hosted at a proxy server in the private network and accessible to the network
3 entity.

1 11. A system for managing a network entity comprising:
2 a management proxy hosted in a service provider network;
3 a management communication transport hosted at the network element and
4 communicatively coupled to the management proxy, and comprising one or
5 more sequences of instructions which, when executed by the network entity,
6 causes the network entity to perform the steps of:
7 receiving a request from a management application for interaction with the managed
8 network entity;
9 creating a management request that includes a network element identifier;
10 storing a management request in the management proxy while awaiting a poll for the
11 management request from the managed network entity;
12 receiving a periodic poll message from the managed network entity, wherein the poll
13 message requests any available management requests applicable to the
14 managed network entity;
15 selecting one or more management requests that match the managed network entity;
16 and
17 delivering the selected one or more management requests to the managed network
18 entity.

1 12. A system as recited in Claim 11, wherein the instructions further comprise sequences
2 of instructions for performing the steps of:

3 receiving a responsive management message from the managed network entity;
4 storing the responsive management message in the management proxy;
5 receiving a second poll message from the management application, wherein the
6 second poll message requests any responsive management messages
7 applicable to the management application;
8 selecting one or more responsive management messages that match the management
9 application; and
10 delivering the selected one or more responsive management messages to the
11 management application.

1 13. A system as recited in Claim 11, wherein the management proxy is hosted at the
2 network entity.

1 14. A system as recited in Claim 11, wherein the management proxy is hosted at a proxy
2 server in the private network and accessible to the network entity.

1 15. A system as recited in any of Claims 7 or 11, wherein the network entity is within a
2 private network that is managed by a network service provider, and wherein the management
3 point is within a public network that is owned or operated by the network service provider.

1 16. A system as recited in any of Claims 7 or 11, wherein the network entity is a service
2 appliance.

1 17. A system as recited in any of Claims 7 or 11, wherein the network entity is a switch
2 or router.

1 18. A computer-readable medium carrying one or more sequences of instructions for
2 managing a network entity through initiation by the network entity, which instructions, when
3 executed by one or more processors, cause the one or more processors to carry out the steps
4 of any of Claims 1, 2, or 3.

1 19. A computer-readable medium as recited in Claim 18, wherein the network entity is
2 within a private network that is managed by a network service provider, and wherein the
3 management point is within a public network that is owned or operated by the network
4 service provider.

1 20. A computer-readable medium as recited in Claim 18, wherein the network entity is a
2 service appliance.

1 21. A computer-readable medium as recited in Claim 18, wherein the network entity is a
2 switch or router.

1 22. An apparatus for managing a network entity that is initiated by the network entity,
2 comprising:
3 means for monitoring the network entity;
4 means for periodically evaluating one or more specified conditions at the managed
5 network entity;
6 means for gathering, when one or more of the specified conditions are satisfied,
7 specified information from the managed network entity, for preparing a
8 message that includes the specified information and the specified conditions
9 that were satisfied, and for sending the message to a management point.

1 23. An apparatus for managing a network entity that is initiated by the network entity,
2 comprising:

3 means for receiving a request from a management application for interaction with the
4 managed network entity;

5 means for creating a management request that includes a network element identifier;

6 means for storing a management request in a management proxy while awaiting a
7 poll for the management request from the managed network entity;

8 means for receiving a periodic poll message from the managed network entity,
9 wherein the poll message requests any available management requests

10 applicable to the managed network entity;

11 means for selecting one or more management requests that match the managed
12 network entity; and

13 means for delivering the selected one or more management requests to the managed
14 network entity.

1 24. An apparatus as recited in Claim 23, further comprising:

2 means for receiving a responsive management message from the managed network
3 entity;

4 means for storing the responsive management message in the management proxy;

5 means for receiving a second poll message from the management application,

6 wherein the second poll message requests any responsive management
7 messages applicable to the management application;

8 means for selecting one or more responsive management messages that match the
9 management application; and

10 means for delivering the selected one or more responsive management messages to
11 the management application.

1 25. An apparatus as recited in any of Claims 22 or 23, wherein the network entity is
2 within a private network that is managed by a network service provider, and wherein the
3 management point is within a public network that is owned or operated by the network
4 service provider.

1 26. An apparatus as recited in any of Claims 22 or 23, wherein the network entity is a
2 service appliance.

1 27. An apparatus as recited in any of Claims 22 or 23, wherein the network entity is a
2 switch or router.

1 28. A method for a network element to initiate notification to a management point about
2 an anomalous condition, comprising the computer-implemented steps of:
3 receiving first definitions of one or more triggers, each comprising one or more
4 conditions;
5 receiving second definitions of report information;
6 determining that any of the triggers is satisfied, and in response thereto, initiating at
7 the network element communication of at least some of the report
8 information.

1 29. A method as recited in Claim 28, wherein each of the conditions comprises an event,
2 alarm, combination of events or alarms, or pattern of events or alarms.

1 30. A method as recited in Claim 28, wherein each of the conditions comprises a state of
2 the network element.

1 31. A method as recited in Claim 28, wherein the report information describes any of the
2 triggers that were determined as satisfied.

1 32. A method as recited in Claim 28, wherein the report information comprises any of a
2 core dump from the network element, a configuration of the network element, state
3 information for the network element, or a log of the network element.

1 33. A method as recited in Claim 28, wherein the steps are performed by a server that is
2 logically separate from the network element, wherein the server manages notifications for a
3 plurality of network elements.

1 34. A method for a network element to initiate notification to a management point about
2 an anomalous condition, comprising the computer-implemented steps of:
3 requesting a management gateway that is communicatively coupled to the network
4 element to provide one or more application requests for the network element
5 that have been stored at the management gateway by an application;
6 in response to receiving an application request, initiating at the network element a
7 communication session between the network element and the management
8 application for enabling the network element to reply to the application
9 request.

1 35. A method as recited in Claim 34, wherein the steps are performed by a server that is
2 logically separate from the network element and communicatively coupled to the
3 management gateway.

1 36. A method as recited in Claim 34, further comprising the step of initiating at the
2 network element communication of at least some of the report information that is responsive
3 to the application request.

1 37. A method as recited in Claim 34, wherein each of the application requests comprises
2 first definitions of one or more triggers, each comprising one or more conditions, and second
3 definitions of report information; and further comprising the step of determining that any of
4 the triggers is satisfied, and in response thereto, initiating at the network element
5 communication of at least some of the report information.

1 38. A method as recited in Claim 37, wherein each of the conditions comprises an event,
2 alarm, combination of events or alarms, or pattern of events or alarms.

1 39. A method as recited in Claim 37, wherein each of the conditions comprises a state of
2 the network element.

1 40. A method as recited in Claim 37, wherein the report information describes any of the
2 triggers that were determined as satisfied.

1 41. A method as recited in Claim 37, wherein the report information comprises any of a
2 core dump from the network element, a configuration of the network element, state
3 information for the network element, or a log of the network element.